

Claims

What is claimed is:

- 1 1. A framing shutter assembly for a luminaire providing a
2 beam of light, said framing shutter assembly comprising:
3 a stack of plates having aligned central openings defining a light
4 path through the shutter assembly, said light path having a longitudinal
5 axis, a plurality of said plates being mounted for rotation around said
6 axis;
7 a shutter blade;
8 a first of said plurality of plates being a rotation guide plate
9 having a guide slot extending from said central opening of said rotation
10 guide plate, said guide slot receiving said shutter blade and mounting
11 said shutter blade for translational motion into and out of said central
12 opening of said first plate for selectively blocking a portion of said light
13 path;
14 a second of said plurality of plates being a translation guide plate;
15 and
16 a cam and follower combination including a first camming element
17 on said translation guide plate and a second camming element on said
18 shutter blade engaging said first camming element and moving said
19 shutter blade along said guide slot in response to rotation of said
20 translation guide plate relative to rotation said guide plate.
- 1 2. A framing shutter assembly as claimed in claim 1, said first
2 and second camming elements comprising an arcuate slot in said
3 translation guide plate and a cam follower projection mounted on said
4 shutter blade.
- 1 3. A framing shutter assembly as claimed in claim 1, said
2 shutter blade being coplanar with said rotation guide plate.
- 1 4. A framing shutter assembly as claimed in claim 3, said
2 shutter blade, said rotation guide plate and said translation guide plates
3 all being made of sheet metal.

1 5. A framing shutter assembly as claimed in claim 3, said
2 shutter blade, said rotation guide plate and said translation guide plates
3 all being made of sheet metal having the same thickness.

1 6. A framing shutter assembly as claimed in claim 3, said
2 shutter blade, said rotation guide plate and said translation guide plates
3 all being made from a single piece of sheet metal.

1 7. A framing shutter assembly comprising:
2 a plurality of sheet metal rings having circular central openings,
3 said rings being in a laminar formation with said circular central
4 openings aligned to define a circular cylindrical nest;
5 a stack of a plurality of sheet metal circular plates rotatably
6 received in said nest, said plates having central apertures aligned to
7 define a light path;
8 four of said circular plates being shutter guide plates having guide
9 slots extending outward from said central apertures; and
10 four shutter blades slideably received in said guide slots for
11 movement into and out of said light path.

1 8. The framing shutter assembly of claim 7, said plurality of
2 sheet metal rings being equal in number to said plurality of circular
3 plates.

1 9. The framing shutter assembly of claim 8, said sheet metal
2 rings and said circular plates having the same thickness.

1 10. The framing shutter assembly of claim 9, said shutter
2 blades being made of sheet metal having the same thickness as said
3 circular plates.

1 11. The framing shutter assembly of claim 9, said sheet metal
2 rings and said circular plates being made from a single sheet of metal.

1 12. The framing shutter assembly of claim 7, another four of
2 said circular plates being shutter drive plates having cam structures, and
3 said shutter blades having cam followers mating with said cam
4 structures.

1 13. The framing shutter assembly of claim 12, said shutter
2 guide plates being adjacent to one another in said stack.

1 14. The framing shutter assembly of claim 13, said shutter
2 guide plates being sandwiched between pairs of said shutter drive
3 plates.

1 15. The framing shutter assembly of claim 14, further
2 comprising a pair of end plates attached to opposite ends of said nest to
3 retain said circular plates in said nest, said end plates having central
4 apertures aligned with said light path.

1 16. The framing shutter assembly of claim 12, said shutter
2 guide plates including two pairs of identical circular plates and said
3 shutter drive plates including two pairs of identical circular plates.

1 17. The framing shutter assembly of claim 7, each said sheet
2 metal ring having a drive member receiving recess adjoining said circular
3 central opening, and a plurality of drive members each received on one
4 of said drive member receiving recesses and engaging the periphery of
5 one of said circular plates.

1 18. The framing shutter assembly of claim 17, said circular
2 plates having peripheral gear teeth and said drive members comprising
3 sheet metal pinion gears meshed with said gear teeth.

1 19. The framing shutter assembly of claim 17, all of said sheet
2 metal rings being identical.

1 20. The framing shutter assembly of claim 19, said sheet metal
2 rings being oriented in said laminar formation so that said drive member
3 receiving recesses are arrayed peripherally around the circumference of
4 said nest.

1 21. The framing shutter assembly of claim 20, further
2 comprising a pair of end plates attached to opposite ends of said nest to
3 retain said circular plates in said nest, said end plates having central
4 apertures aligned with said light path, a plurality of drive openings
5 extending through said laminar formation intersecting said drive member
6 receiving recesses, and a plurality of motors mounted adjacent at least
7 one of said end plates and having drive shafts extending through said
8 drive openings and connected to said drive members.

1 22. A framing shutter assembly for shaping a beam of light,
2 said framing shutter assembly comprising:
3 a stack of circular disks made of sheet material , said disks being
4 mounted for rotation around a common axis;
5 said disks having aligned central openings defining a light path for
6 the beam of light;
7 a plurality of shutter blades;
8 a first plurality of said disks having recesses supporting said
9 shutter blades for movement into and out of said light path; and
10 a second plurality of said disks having drive members engaging
11 said shutter blades.

1 23. A framing shutter assembly as claimed in claim 22, further
2 comprising a plurality of drivers for rotating said disks.

1 24. A framing shutter assembly as claimed in claim 23, said
2 drivers including motors.

1 25. A framing shutter assembly as claimed in claim 22, further
2 comprising a plurality of drive motors, and a plurality of drive members
3 coupled between said drive motors and said disks.

1 26. A shutter controlling subassembly for a shutter assembly,
2 said shutter controlling subassembly comprising:
3 a shutter blade;
4 a first guide plate having a slot capturing said shutter plate in an
5 orientation coplanar with said first guide plate;
6 a light path extending through said slot;
7 said slot holding said shutter plate for sliding movement relative
8 to said light path;
9 a second guide plate parallel to said first guide plate;
10 a plate mounting structure mounting said first and second guide
11 plates for simultaneous and for independent rotation; and
12 first and second cam elements defined respectively on said
13 second guide plate and on said shutter plate, said cam elements
14 engaging one another for sliding said shutter plate in said slot in
15 response to rotation of said first guide plate relative to said second
16 guide plate.

1 27. A method of making components of a framing shutter
2 assembly from a single sheet of metal, said method comprising:
3 severing the following parts from the single sheet of metal:
4 a plurality of shutter blades
5 a plurality of rotation guide plates having central openings
6 and guide slots for receiving the shutter blades; and
7 a plurality of translation guide plates having central
8 openings and cams for translating the shutter blades;
9 loading the shutter blades into the guide slots in the rotation
10 guide plates; and
11 stacking the rotation guide plates and the translation guide plates
12 with their central openings in alignment.

1 28. The method of claim 27 further comprising:
2 severing from the single sheet of metal a plurality of ring members
3 equal in number to the aggregate number of the rotation guide plates
4 and the translation guide plates;
5 fastening the ring members to one another to form a nest for the
6 stack of rotation guide plates and translation guide plates; and
7 placing the stack of rotation guide plates and translation guide
8 plates into the nest.

1 29. The method of claim 28 further comprising:
2 making gear teeth on the peripheries of the rotation guide plates
3 and the translation guide plates;
4 forming pinion gear cradles in the gear members;
5 said fastening step including locating the pinion gear cradles at
6 peripherally spaced locations around the nest, each in alignment with
7 the gear teeth of one of the rotation guide plates and the translation
8 guide plates;
9 severing from the same sheet of metal a plurality of pinion gears;
10 and
11 loading the pinion gears into the pinion gear cradles in
12 engagement with the gear teeth of the rotation guide plates and the
13 translation guide plates.

1 30. The method of claim 29 further comprising:
2 retaining the stack of rotation guide plates and translation guide
3 plates and the pinion gears by attaching end plates to the nest at
4 opposite ends of the stack of rotation guide plates and translation guide
5 plates.